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ABSTRACT

This paper describes the use of the microcomputer electronic spreadsheet in various ways in a school district, including the management of the standardized testing program. The sections of the paper include: "Microcomputer Electronic Spreadsheet Structure", "Macro Instruction Sets", "Student Information", "Faculty Information", "Administrative Information", "Supervisory Information", and "Technical Considerations." (Contains 17 references.) (SLD)

Use of Microcomputer Electronic Spreadsheets for Standardized Examinations and Processing of Information.

Herman J. Hinitz, Ph.D

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USE OF MICROCOMPUTER ELECTRONIC SPREADSHEETS FOR STANDARDIZED EXAMINATIONS AND PROCESSING OF INFORMATION

Herman J. Hinitz, Ph.D.

The microcomputer electronic spreadsheet can be used for various functions in a school district (1), including helping to deal with various aspects of the standardized testing program (2).

The spreadsheet can be perceived and employed as a two dimensional text or word processing tool, in addition to the employment of the power and capability of the mathematical, statistical, and database functions which are still available for use. Introduction of the Core Curriculum Content Standards, and the consequent revisions to the statewide standardized testing program can lead to an increase in the volume of records that are required under the various regulations and guidelines. In addition, the increase in interactions among administrators, teachers, students, staff, and central office personnel within the school district, as well as with external local, county, state, and federal agencies involved with these and other related programs, further increases the volume of records. Also, the retrieval time can increase for a particular item of information to be obtained from the district's database. Additional ancillary interactions, such as inquiries regarding a student's current status, from other sources such as parents, and scholarship funding agencies, for example, can also increase the overall workload.

It is beneficial to consider the application of microcomputer electronic spreadsheets in order to more effectively deal with the various aspects of the record keeping process for each test administration for each student. Also suitable for the electronic spreadsheet format is the scheduling of students for examinations, and of staff administering or proctoring the exams. In addition, it is possible to include on an electronic spreadsheet, any modifications or accommodations specified in a special education student's Individual Educational Program(IEP) or Section 504 Plan (3,4).

Microcomputer Electronic Spreadsheet Structure

A spreadsheet cell is the rectangle formed by the intersection of a row with a column. The rows are numbered down the left side, while the columns have letter designations. For example, cell B4 is located in the second column and in the fourth row, and cell D2 can be found in the fourth column and in the second row. Each of these cells could contain numerical, alphabetical, or alphanumeric information, as well as computational formulas. This electronic spreadsheet provides the capability to make modifications in the values and information entered in the individual cells in the spreadsheet. At the same time, any row and column sums, and other dependent variable data (alphabetical, numerical, and/or alphanumerical) can automatically be calculated and/or updated by the program.

The more powerful electronic spreadsheet programs provide a matrix of ap-

proximately 250 columns by approximately 8000 rows, in Lotus<R> 1-2-3<R> and in Quattro Pro<R>, and approximately 16000 rows in Excel<R>, for example. These electronic spreadsheet programs are able to interchange information with each other through established protocols and procedures. Information can also be interchanged with word processing and database management programs. Integrated programs are available which offer word processing, electronic spreadsheet, graphics, and database management applications programs capabilities within one operational package. A file of information can be prepared with one part of the package, and then modified by another segment of the package. The capability to exchange (or import and export) information with other popular microcomputer applications programs is incorporated into these integrated packages or suites.

In these spreadsheet programs with three dimensional capability, 256 pages are available. In general, in each cell, it is possible to fit in as many as 254 alphanumeric characters of information. This information can be updated, copied, and moved around as needed to maintain the accuracy and utility of the database. Various cells can be inter-related or linked as appropriate.

Macro Instruction Sets

Macros are instruction set sequences which provide faster shortcut procedures for repetitive operations. As a series of instructions or operations are carried out, one step at a time, in the correct order, this sequence can be recorded and saved in a macro file. This macro file can be run or executed by pressing the appropriate two-key combination on the keyboard. The file can be edited as needed to optimize its usage and to eliminate any errors or inappropriate actions. The macro language capabilities and options available within the more powerful spreadsheets, provide a programming capability which in their own way within the spreadsheet structure can be considered as effective and proficient counterparts to such programming languages as BASIC, FORTRAN, COBOL, C++, MODULA 2, etc. These macro instruction sets can contain closed loop, nested DO loop repetitive sequences, IF statement logical decisions, branches to subroutines, calls to subprograms at appropriate points in the sequences, etc. Some of the options and instructions within the macro programming language have the same names and general functions as the counterparts found in the more formal programming languages.

Some of the spreadsheet programs have previously prepared macro files for some commonly encountered sequences within the more normal usage of the spreadsheet to deal with financial and numerical matters. In addition, templates may already be present for popular application layouts and formats. Some of these already available macro and template files can be adapted to district testing programs.

Student Information

Student records can be maintained for the results of testing already completed, in addition to a listing of examinations not yet taken. Fulfillment of prerequisite eligibility requirements (completion of particular courses, grade level, etc.) in

order to be admitted to a particular examination, and individual accommodations or modifications needed for special education or Section 504 students can be listed and dynamically linked to each student's information. Logical operators, such as AND, OR, IF, etc. can be used to provide messages at opportune times in the academic progress of individual students. These messages can include reminders about which tests are appropriate at a particular time and any testing modifications specified in an IEP for any test administration.

The mathematical and statistical functions can be utilized to provide useful information. For example, a count or sum can be obtained for how many students are scheduled to take a particular examination. This total can also be entered at the same time, in an appropriate summary form which contains information about the number of test booklets needed by the linking of the associated cells and/or programs.

It is possible to prepare individualized or customized handout papers for each student, which contain the examination information for the individual student for each testing cycle. As a security measure, a single page can serve as the admission form for each examination. This page can contain the student's signature (either as an original obtained in a subject class where this form is distributed or a digitized facsimile), and possibly a digitized monochrome portrait of the student (from photo identification cards which are utilized in some school districts or photographs which the students provide that become part of their records and are updated at periodic intervals). These forms can be prepared as part of a mail merge sequence in which the structure of the general examination form is completed with specific information in regard to each student's exam schedule and requirements. Additional information and messages can be entered for a particular student and/or examination. If a student has an exam conflict and is scheduled to take two or more exams in the same time period, advance preparations can be made. Other variations from the original structure can be dealt with in a similar fashion.

Once the student is present in the exam room, this form can be signed and a visual comparison can be made between the signature and portrait on the paper and the student. This paper can be used as the admission form for all exams, and can be collected at a central location at the conclusion of the examination schedule for closure with respect to which exams were taken when and where, and if there were any changes made with respect to the original arrangements. Any information that should be considered for future examinations in general and/or for particular students can be collected from these forms, in addition to other sources. In this way, the testing process continues to develop and evolve into a more optimum sequence with diminishing difficulties as any problems are dealt with on an on-going basis and obviated or minimized.

Testing results can be examined for the mean (average), mode, median, and standard deviation, again utilizing the appropriate built-in and already available mathematical and statistical functions. In addition, a summary can be

obtained for the total number of students present for testing, those who achieved a passing grade and those who did not, and any students who were absent from the test administration for which they were eligible and scheduled.

Utilizing the appropriate macro instruction sets, those students who passed the examinations can have their records updated, and notations can be made to prepare the students for the next cycle of exams in their individual sequences. In regard to the students who did not pass or did not take the examinations, these students can be scheduled for the applicable tests, again with the use of the appropriate macro instruction sets.

Once a student has successfully completed all the testing requirements for graduation and receipt of a diploma, the electronic spreadsheet program can be used to prepare the documentation to inform administrative personnel of the status of each student. The spreadsheet can be used to prepare lists of students who fit into one or more nonexclusive categories. These lists can be sorted, and arranged in sequences for various purposes, as needed for processing in different segments of the examination preparation, administration, and summary procedures. Similar forms can be used to apprise students of their individual test results, and to notify them regarding which exams the students would be scheduled to take in the future. Additional messages can be added as applicable for given situations and students.

Faculty Information

Many examination administrations require staff members to oversee and administer the exams to the students, under the appropriate conditions and guidelines. Once the number of students scheduled to take a particular examination is determined, these students can be assigned to specific rooms. It then becomes possible to schedule staff members to administer each exam. Once this information has been determined, the need for any additional personnel can be resolved, such as hall patrol individuals, and stand by or reserve individuals to replace absent or unavailable faculty members.

All of this information can be listed and determined in the spreadsheet format of rows and columns, which can be provided in a two dimensional arrangement of times and days of the testing period, along with the rooms to be used to administer the examinations, and any other relevant information, such as where the exams should be picked up and returned, the beginning and ending times of the exams, the location of any examination consolidation or continuation rooms (if applicable) after the general or normal examination time period has concluded. This two dimensional schedule grid can be used to locate teachers, rooms in use, empty rooms available for overflow situations, students, staff, and other information. Dynamic links to other cells or portions of this and other spreadsheet files, can provide for dynamic updating of the data as information is entered or modified. This information can be rearranged or sorted for example, to provide teachers with a list of when they are scheduled to be in particular rooms.

Administrative Information

Lists of testing results and statistical summaries can be obtained from the examination database, and reports can be prepared for the appropriate individuals in the school site, as well as in the central district offices and others involved in an evaluation of the results.

With the more powerful spreadsheet programs, it is possible to have different typeface fonts in different point sizes, in particular cells, and/or ranges or blocks of cells, as needed to delineate specific information. The availability of color selection for the video display, especially in WYSWYG (What You See is What You Get) graphics mode, provides greater utility with the program summary of information, as various data can be color and font coordinated.

It is possible with the appropriate use of logical operators, such as IF statements, to have various messages and flags provide information as situations are modified as needed. This capability provides some safeguards against logistical errors in so far as they are able to be anticipated. These messages could also be font, point size, and color coordinated.

Utilizing a variation of typewriter art, the rooms that are in use for an examination session can be highlighted in a schematic floor plan layout in the rows and columns of the spreadsheet, utilizing the color and font selection capabilities of the spreadsheet program. Other rooms which have not been utilized but are available if needed, can be indicated in an alternative font, point size, and/or color. Appearance options, such as bold, underline, italic, etc. may also be available under the appropriate circumstances.

With the proper planning, it is possible for particular groups within the educational setting to enter their specific information into a spreadsheet, in predetermined locations or ranges or blocks. Using established procedures, these ranges or blocks of information can be merged into other spreadsheet files, for subsequent processing by other individuals involved in the examination process.

Supervisory Information

Lists can be prepared of the students who did not pass particular examinations, and would be scheduled to take certain classes again in order to be more prepared for the examinations. It is anticipated they would then have a greater capability with the material, and have a greater degree of probability to achieve a higher and passing grade when the examination is retaken. This information would be useful in determining the magnitude of the student populations available for specific classes in the coming year, and the number of faculty members needed for particular classes in the various subject areas. It would also permit advance planning for future personnel requirements and logistics.

The listing of examiner and proctor assignments, together with the time frames available for the grading of the various examinations (if applicable), can provide for appropriate planning to facilitate the work that needs to be done, by showing who is available. In some cases, preferences can be dealt with in

terms of which staff prefer to proctor instead of marking the exams, for example, and/or those who have specific scheduling requirements or constraints.

Technical Considerations

In general, once an item of information has been entered into the spreadsheet database, it does not have to be re-entered. The spreadsheet program can be used to provide selected information as needed for different purposes in a variety of formats, listings, and reports. Information that is present in one report does not predetermine what will or will not appear in another report or format. The various cells can be dynamically or hot-linked with counterpart word processing and database files as one package with several components that are linked or correlated appropriately. As information is updated in one file, the spreadsheet, for example, the corresponding information in the other files and locations is updated at the same time, automatically. This process can reduce the amount of the inadvertent inclusion of errors.

Graphics programs can be used to prepare appropriate images, process flow charts, diagrams, signs, posters, announcements, updated information, tables, etc. to facilitate the smooth operation of the testing process and related procedures.

Conclusion

The structure of the examination process and sequence in a particular setting can be designed within a microcomputer electronic spreadsheet framework. This microcomputer structure can be sufficiently flexible to undergo continual dynamic modification and updating as required to deal with new information and situations. The information can be integrated, dynamically linked, exchanged, and processed together with other microcomputer programs such as word processing, database, graphics, communications, etc. Statistical summaries and reports can be produced and processed, as appropriate for given situations.

Dr. Hinitz has taught Chemistry, Advanced Placement Chemistry, Physics, Biology, Electrical and Electronic Engineering, Computer Technology and Applications, and Earth Science in the New York and Philadelphia Public School Systems. Dr. Hinitz has been an Adjunct Faculty member of Trenton State College and St. John's University. He has dealt with the computerization, streamlining, coordination, and administration of New York State Regents standardized examinations involving an urban high school with responsibility for over three thousand students, and more than two hundred faculty and staff, and effectively developed, adapted, and utilized procedures discussed in this monograph.

For more information regarding the use of microcomputer spreadsheets and the testing process, you may contact:

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